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Effect of Borrower's Socio-Economic Profile on Agribusiness Loans Default Rate in Agricultural Finance Corporation, Mount Kenya Region

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Agribusiness loans advanced by Agricultural Finance Corporation (AFC) in Mount Kenya Region have high default rate of 20.33% which compares unfavourably with 10% benchmark for all types of loans in Kenya. This is a challenge, given the strategic importance of agribusiness credit in mainstreaming livelihoods to alleviate poverty by offering occupational and professional opportunities. This study aimed at analysing effect of borrower's socio-economic profile on AFC loan default rate in agricultural finance corporation, Mount Kenya Region.
Methods: According to AFC records Mount Kenya region represents a branch network of 11 branches and a population of 3,002 agribusiness borrowers. Using a descriptive research design a sample of 300 borrowers was drawn from a combined list through systematic random sampling

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technique with an interval of ten. Primary data on borrower's socio-economic profile was collected using a structured questionnaire. The data was analysed using Statistical Packages for Social Sciences (SPSS V.27) and Stata version. Using regression analysis, the effect of independent and dependent variable to predict default rate was estimated. ANOVA was performed to get the F-statistic so as to test for the adequacy of the regression model. The logit econometric model was used to specify the statistical relationship between the independent variable and AFC loan default.

Results: Results of the study revealed that multiple borrowing and borrower-lender distance were significant at 5%. Farming experience, borrowing experience and off-farm income were significant at 10%, 5% and 1% levels of significance. Multiple borrowing and borrower-lender distance were found to have 5.5% and 0.8% associations with default rate, respectively.

Conclusion: The findings show that to mitigate default, the borrower should avoid multiple borrowing and manage the friction of distance. The study is significant since it enlightens the credit stakeholders on collective efforts that are effective in addressing the problem of default. The study recommends government interventionist policy by facilitating uptake of agricultural insurance and subsidizing input costs. Borrowers are encouraged to embrace technology, team up as farming communities to look for markets and affordable inputs, adopt agricultural insurances and adhere to lending directives.

Keywords: AFC loan; default rate; Borrower's socio-economic profile: Repayment.

1. INTRODUCTION

Globally, agribusiness actualizes the achievement of the goal of reducing extreme poverty, boosting shared prosperity, raising income profiles and improving food security [1]. In Africa, agribusiness guarantees that food production is sufficient for burgeoning population and that blossoming industries have access to raw materials [2]. In Sub Saharan Africa, agribusiness enterprises satisfy the ever-increasing urban food markets and translate into longer supply lines [3]. The agribusiness sector in Kenya has a snowball effect on socio-economic aspects in terms of generating revenue, creating jobs, foreign exchange earner, food security and poverty alleviation [4]. In Mount Kenya region, agribusiness improves sustainable management by influencing the livelihood-related drivers of food security [5]. Agribusiness embodies both commercial value and creation of working opportunities which attract many Kenyans who find agribusiness to be strategic and thus take advantage of abundant natural resources that Kenya is endowed with [6].

Credit incentivizes diversification streams and intensifies systems of production due to access of a myriad of better-quality inputs and agribusiness complementary services such as research, extension and irrigation [7]. Agribusiness credit plays an integral part in modern farming by mobilizing its inherent productive capacity, thus empowering farmers [8]. Credit enhances purchase of farm inputs like seeds, spraying chemicals, manure and fertilizers; finances costs of weeding, harvesting, storage and transport of produce to market [9]. The credit support function offers players an opportunity for intervention in solving agribusiness liquidity constraints so as to enhance access of high-return investments by the beneficiaries [10]. Governments around the world intervene in provision of credit inducements to farming communities to upsurge productivity in agriculture, subsidize the cost of inputs, stimulate good farming practices, and augment farmer proceeds, besides catering for socio-economic objectives and protection of environment for sustainability concerns [11].

Loan default is of critical concern due to lowering cash flows, depressing liquidity and distressing finances [12]. The high-default rate that characterises agribusiness loans raises concerns given the strategic importance of agribusiness [13]. Default in servicing of loans is a global, regional and national problem triggering a fiasco in suitable lending and reliable policies of credit [14]. The default rate on agricultural loans in Kenya as at June 2022 was 17.5% against 13.7% for all loan types. This compares unfavourably to 10% which is the Central Bank of Kenya benchmark for all types of loans [15] Mount Kenya region recorded a 5-year average default rate of 24.15% in the period 2018/2022 compared to 23.67% for entire AFC [16].

Default downgrades the credit score, harms relationship with the guarantor, causes lack of future refinancing, harassment by debt collectors, and legal garnishment of wages [17]. Borrowers are under pressure to sell the harvest

at low price; face legal action of seizing the collateral and liquidating it and total exclusion from credit markets [18]. They also incur drawbacks in reputational damage and costs that are opportune to investments that are forgone [19]. Causes of loan default include poverty, political influence, lack of profitable innovation, traditional farming practices, deficiency in farm plans, unsatisfactory management and limited formal literacy among loan beneficiaries [20]. Default is also caused by poor decisions, poor financial record, poor sales, sickness, misuse of loan [21], inadequate follow up of loan repayment and lack of training on loan use [22]. Default derails the lending operations and makes the policy of providing affordable credit by government to small-scale farmers a delusion since credit programmes do not run as anticipated. If the situation continues unchanged, there is a possibility of credit rationing, perpetuating poverty levels and closure of credit financing.

Borrower's socio-economic profile was indicated in farming experience, off-farm income, borrower-lender distance [19], multiple borrowing [23] and borrowing experience [24]. This study adopted farming experience, borrowing experience, off-farm income, multiple borrowing and borrower-lender distance as the indicators of borrower socio-economic profile. Default is indicated by identifying rates of repayment, delay in loan servicing and repayment amounts [25]. This study adopted percentage of defaulted loans as measure of loan default rate. Mount Kenya region of Agricultural Finance Corporation was selected for study due to a variety of agribusiness projects and the highest number of branch network. Extant studies on AFC Kenya carried out by Mutulu [26], Nekesa [27], Musyoki [28], and Yegon [29], found that default is a great problem hindering the performance of AFC loans. These studies had gaps due to use of small sample sizes and narrow perspectives of analysis. To address these gaps, this study adopted a bigger sample size and explored more indicators to widen the purview. The specific objective of this study was to appraise the effect of borrower's socio-economic profile on AFC loan default.

2. METHODOLOGY

2.1 Study Area

The study was conducted between June 2022 and December 2022 in Mount Kenya region, which is one of the AFC catchment areas within the country. This region was selected through convenience sampling because of good branch network, variety of agribusiness activities and agroclimatic zones. The branch network of this region comprises of 11 branches which includes Meru, Chogoria, Embu, Kerugoya, Thika, Murang'a, Nyahururu, Maralal, Nanyuki, Nyeri and Karatina. These branches are spread in the 9 counties which include Meru, Tharaka-Nithi, Embu, Kirinyaga, Kiambu, Murang'a, Samburu, Laikipia and Nyeri.

2.2 Research Design

The study used descriptive research design. This design was accurate and systematic and enabled the possibility of using diverse methods of research to examine, observe and measure variables which concern default in AFC agribusiness loans in Mount Kenya Region. Adusei [13] adopted this design to examine the determinants of agribusiness entities loan default in Ghana. Also, this design was adopted by Chege [30] to examine practices of managing loans and credit non-repayment AFC, Kenya.

2.3 Population, Sampling Procedures and Sample Size Determination

2.3.1 Study population

The population of study was 3,002 farmers who had borrowed agribusiness loans from the 11 branches of Mount Kenya region for the period 2018/2022.These borrowers comprise of all current beneficiaries without regard to their loan level and repayment performance.

2.3.2 Sampling procedures

Using systematic random sampling method with a 'skip' of ten, a sample of 300 borrowers was retrieved and reviewed. By "skipping" at the interval of 10, overconcentration in one branch was eliminated, thus fair distribution which guaranteed representativeness. The interval guarantees that the sample is drawn from both defaulters and non-defaulters [24]. In our case the sampling interval was determined thus: k= 3,002/300 = 10. This means that, the respondents were selected from AFC list at random after skipping ten.

2.3.3 Sample size determination

To calculate the size of the sample, Daniel [31] formula was used as follows:

$$n = \frac{Z^2 P (1-P)}{d^2}$$

where;

n = sample size; Z = Z statistic for a level of confidence; P = expected default or proportion (in proportion of one; if 20%, P = 0.2), and d = precision (in proportion of one; if 5%, d = 0.05). For the level of confidence of 95%, which is conventional, Z value is 1.96. In our case, defaulters represented 24.15% of the total beneficiaries. To establish the sample size the following calculation was done:

$$n = \frac{1.96^2 \times 0.2415(1-0.2415)}{(0.04843)2} = \frac{0.7036956444}{0.0023454649} = 300$$

where;

Z=confidence level =1.96; *P*= Default =0.2415; *d* = precision =0.04843; *n* = 300

2.4 Pilot Study

The structured questionnaire was pilot tested in Central Rift region where respondents were drawn from 4 branches namely Nakuru, Naivasha, Molo and Kericho using 30 respondents who are agribusiness borrowers. Central rift is more similar to Mount Kenya due to its weather conditions and diversity of agribusiness projects.

2.5 Validity

The study employed a questionnaire which was tailored keenly and thoroughly to ensure that all relevant material facts were captured. This established its relevance to the study b y producing accurate results.

2.6 Reliability

Cronbach's alpha was used to evaluate questionnaire since it is appropriate for dichotomous variables coded as 0 or 1 meaning no internal consistency or consistency is perfect between items in the questionnaire, respectively [32]. Results from this study indicated that the questionnaire was reliable since the scale reliability coefficient was 0.7318>0.7 which is the acceptable scale. This value of more than 0.7, means that the data taken was sufficiently reliable and consistent (Table 1). George [33] provided that the scale reliability coefficient of any research instrument should be greater than 0.7 for it to be deemed acceptable and reliable.

Table 1. Reliability test using Cronbach Alpha

Variable	Value
Average interim covariance	2.365
Number of items in the scale	15
Scale reliability coefficient	0.7318

2.7 Data Collection

The questionnaire was used to collect quantitative data where the 300 respondents provided answers regarding their socio-economic profile. Respondents were guided on how to answer questions by enumerators.

2.8 Data Analysis

2.8.1 Data analysis techniques and tools

The software for analysis was Statistical Packages for Social Sciences (SPSS V. 27.0) and Stata version 15. The output from quantitative data was given in descriptive statistics and regression analysis. Regression analysis was used to describe the relationship between independent and dependent variables. The econometric model that was used was Logit. Correlation analysis was used to evaluate the strength of a relationship between the variables. ANOVA was performed to get the F-statistic so as to test for the adequacy of the regression model.

2.8.2 Model specification on the effect of borrower's socio-economic profile on AFC Loan default rate

To achieve this objective logit regression with Bernoulli distribution was used. In this model, the variables take the value of 1 with a probability p and the value of 0 with the probability of q=1-p [34]. If X is a random variable, then:

$$\Pr(X=1) = p = 1 - \Pr(X=0) = 1 - q \qquad (i)$$

A random variable is distributed according to a Bernoulli distribution if it is binary. Bernoulli models use logistic regression, where:

$$Log\left[\frac{p}{(1-p)}\right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (ii)$$

In this case, p indicates the probability of default, with "1" representing default while "0" indicates non default. The logistic regression model with Bernoulli distribution that was used for this study to determine the effect of borrower's social economic profile on AFC loan default rate is expressed as follows:

$$Y = \log\left(\frac{p}{1-p}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \dots\dots (iii)$$

where Y is AFC loan default rate, α is the intercept, which is the amount of loan repaid in shillings, $\beta_1 - \beta_5$ are coefficients of regression, ε_i is the error term which captures the effects of unnamed variables which are in the model. The α and βs are the parameters for estimation. X_1 = Farming experience; X_2 = Borrowing experience; X_3 = Off-farm income; X_4 =Multiple borrowing and X_5 = Borrower-lender distance.

3. RESULTS AND DISCUSSION

3.1 Effect of Borrower Socio-economic Profile on AFC Loan Default Rate

3.1.1 Farming experience

3.1.1.1 Repayment status of loan based on experience in farming

Results indicated that a majority of respondents (32%) had more than 15 years' experience in farming. Borrowers with above 10 to 15 years, constituted 30%. This follows that 62% of borrowers had experience spanning over 10 years. Therefore, most of the borrowers in the area of study had experiential expertise. A large number of these borrowers were repeat borrowers who had graduated after successful completion of the preceding loans. Respondents below 5 years in farming constituted 14.33%. The category above 5 up to 10 years comprised of 23.67%. This means that borrowers who had up to 10 years constituted 38% (Table 2).

On loan repayment performance, it was established that farmers with an experience of less than five years had a default rate of 36.07%, while those with over 15 years of experience defaulted by 9.84%. The default rate for the category of borrowers whose experience is above 5 up to 10 years was 32.79%. Overall, the rate of default for borrowers whose experience did not exceed 10 years was 68.85%. The tier of borrowers with experience above 10 up to 15 years registered a default rate of 21.31%. This sums default for borrowers above 10 years to 31.15% which is less compared to sum of default for borrowers whose experience in farming was less than 10 years (68.85%). The relationship between farming experience and loan default was linear since there was successive decrease in default as the farming experience increased.

This study found that all the interviewed borrowers had some experience in farming. This can be attributed to the fact that in supervised lending, the lender (AFC) does not fund start up projects. This finding concurs with those of Wulandari [35] who observed that experience in farming enhanced competence in management, thus improvement in loan servicing. Practical farming equipped the borrower with experiential knowledge to minimize costs as they tackled operational complications, thus increasing incomes available to service credit [36]. Seasoned farmers have upper hand in optimizing output [37] and knowledge regarding the application of inputs and effective mitigation of risks and other farming challenges [38].

3.1.1.2 Repayment of loan based on sum of farming experience

The results indicated that the maximum experience registered in this study spanned to 42 years while the minimum was 3 years. The maximum farming experience was 42 years for compliant borrowers while maximum for defaulters was 25 years. The minimum experience in both default and compliance was 3 years. The mean experience of defaulters was 8.967 years while the average farming experience for compliant respondents was 15.278 years. The mean years of experience of all the respondents was 13.995 years which implies that after doing the farming over and over again for about 13.995 years one would have gained enough experience and skills needed to succeed in farming so as to be able to make profits (Table 3).

This study found that it was also possible for borrowers with above average years in farming to possess the ability to efficiently apply farm inputs into production, thus making enough margins to service their loans. Onyeneke [39] concurred that farming experience made borrowers knowledgeable on efficient utilization of resources, thus compliance in loan repayment. This study also found that experiential knowledge in farming equips the borrower with the requisite

cognitive capacity to predict trends and thus be able to mitigate risks, reduce costs, manoeuvre market failures, generate profitable returns and be able to service the loans. This instils borrowers with confidence in farming. Sagbo [38] agreed that farming experience decreases the likelihood of delinquency; besides, Okpara [40] observed that it translated into skilfulness and ability to manage farming business.

3.1.2 Borrowing experience

3.1.2.1 Loan repayment on the basis of borrowing experience

In this study, all respondents that were interviewed had experience in borrowing. Borrowers with experience in borrowing of above 10 to 15 years, constituted the highest percentage of 29.67%, while the fewest borrowers had experience from above 15 to 20 years, comprising of 11.33% of the sampled borrowers while borrowers with experience spanning above 20 years constituted 12.67%. In all, borrowers whose experience surpassed 10 years constituted 53.67% of the total borrowers (Table 4).

On the other hand, borrowers having below 5 years of experience were 20%, while those above 5 to 10 years' experience in taking credit were 26.33%. Cumulatively, respondents with borrowing experience not exceeding 10 years were 46.33%. This means that the area of study had more experienced borrowers (53.67%) than those considered just to have experience 46.33% (Table 4).

On repayment performance, respondents who had borrowed for less than 5 years recorded 44.26% in default which compares adversely to borrowers with over 20 years' experience who did not default at all, thus registering 0.00% default rate. It also compares unfavourably to those who had borrowed for 15 to 20 years, whose default rate stood at 4.92%. Borrowers with over 10 to 15 years, constituted 19.67%. The default rate for borrowers whose experience surpassed 10 years was 24.59%. The default rate for borrowers in the tier above 5 to 10 years, was 31.15%. Cumulatively, respondents whose experience in borrowing was at most 10 years recorded 75.41% in default rate (Table 4).

Table 2. Distribution of loan repayment status based on experience in farming

Farming experience	Percentage performance		
	Compliance	Default	Total
Below 5 years	8.79	36.07	14.33
More than 5 to 10 years	21.34	32.79	23.67
More than 10 to 15 years	32.22	21.31	30
Above 15 years	37.66	9.84	32
Totals	100	100	100

Pearson chi2(3) = 41.6020 Pr = 0.000

Table 3. Loan repayment status based on sum of farming experience

Farming experience	Observations	Mean	Std. Dev.	Min	Max
Compliance	239	15.278	8.291	3	42
Default	61	8.967	5.092	3	25
Total	300	13.995	8.148	3	42

Table 4. Repayment status of loan based on experience in borrowing

Borrowing experience	Percentage performance		
	Compliance	Default	Total
Below 5 years	13.81	44.26	20
More than 5 to 10 years	25.10	31.15	26.33
More than 10 to 15 years	33.22	19.67	29.67
More than 15 to 20 years	12.97	4.92	11.33
More than 20 years	15.90	0	12.67
Totals	100	100	100

Pearson chi2(4) = 38.2679 Pr = 0.000

Compliant borrowers who had more than 10 to 15 years of experience conformed more by registering the highest compliance rate at 33.22%. Respondents with over 20 years of experience recorded a compliance of 15.90% while those with more than 15 to 20 years complied by 12.97%. The cumulative compliance for borrowers exceeding 10 years of experience in borrowing was observed to be 62.09%. The cumulative compliance for borrowers whose experience did not exceed 10 years was 38.91%. This means that there was more compliance among the most experienced borrowers in credit use as compared to those with little experience. The explanation for the difference: repeat borrowers were more conversant with credit application which enhanced farm income and increased repayment compliance [14]. Also, protection of image and remaining creditworthy was held highly by repeat loanees since it offered a leeway to graduate to the next higher loan [41].

This study found that the relationship between borrowing experience and loan default was linear since there was successive decrease in default as the borrowing experience increased. The likely reason is because repeat borrowers were knowledgeable on productive use of loans; they were also equipped with requisite skillset to handle farm operations in a less risky fashion due to their competence in decisioning and observance of AFC covenants. These findings agree to those of Muthini [42] who found that long experience, implied that loans were well utilized for all agribusiness activities. In addition, Henning [43] concurred that borrowing experience accumulated skills which facilitated manipulation of enterprise environments to thwart non-conformity in repayment. Muruku [44] established that experience was associated with acquaintance in utilization of credit, superior decisions, sound management and use of inputs. Sagbo [14] agreed that experience offered borrowers an upper hand in problem-solving capacity and adherence of banks procedures which enhanced growth of the project and their repayment capacities.

3.1.2.2 Loan repayment status based on sum of borrowing experience

Results showed that the maximum borrowing experience was 40 years while the minimum was 2.5 years. The maximum borrowing experience for the compliant borrowers was 40 years while the maximum for the defaulter is 20 years. The minimum experience for the compliant borrower was 3 years while that of the defaulter was 2.5 years. This study found that the mean experience for all the borrowers was 12.828 years, which means farmers who had attained this borrowing experience would take up loans, utilize them well and repay on a timely fashion. The mean experience for defaulters was far below average at 7.942 years which compares unfavourably to the mean of compliant borrowers which stood at 14.075 years and far much above the average borrowing experience (Table 5).

The findings showed that seniority in borrowing gave an upper hand in loan management by applying the funds into the right income-generating projects that guaranteed adequate cashflows which enhanced their debt servicing efficiency. Seasoned borrowers were also conversant with farm operations that were less risky and had good returns on investment. Experienced borrowers were prepared in their mind-set that debt servicing obligation was their onus. Muruku [44] concurred that experienced farmers were efficient since they had taken time to learn on efficient input combinations which maximized output levels that were not only profitable but also effective in meeting financial commitments.

The other finding was that borrowing experience improved gains in efficiency which translated into sustainability and relatively low costs to enhance productivity in farming. It significantly increased farmers' whole-farm efficiency resulting to increased net farm income gained during the agricultural season. Muthini [42] concurred that experienced borrowers were better able to adopt technical and allocative efficiencies so as to reach equilibrium. This study also observed that experienced borrowers took lesser appraisal time since the rigorous time-consuming screening was eschewed thus reducing the turnaround time for the loan; they utilized AFC funds to advance agribusiness development and were able to offer innovative solutions even in the midst of extraneous shocks. These borrowers were not prone to moral hazard since their target was to actualize excellence and make legacy which would leave a mark in their agribusiness trail. These findings are congruent with Ogouvide [41] who posited that borrowing experience had a positive effect on the profitability scale of the activity and finally on the loan repayment performance.

3.1.3 Off-Farm income

3.1.3.1 Loan repayment status based on off-farm income

Results indicated that 14.67% of the sampled borrowers did not have off-farm opportunities. The highest percentage of borrowers had non-farm income above KSh. 200,000 to ksh. 500,000 composing 45.67% of the total borrowers. Borrowers with up to KSh. 200,000 comprised of 9% of the regional borrowers. Overall, the regional borrowers whose non-agricultural income did not exceed KSh.500,000 constituted 69.34% of all the borrowers. Conversely, borrowers with over KSh. 1,000,000 comprised of the smallest number at 2.33%. Those with off-farm income above KSh. 500,000 to KSh. 800,000 were 22%. Borrowers with non-farm income above KSh. 800,000 to KSh. 1,000,000 formed 6.33% of the sampled borrowers. Added together, borrowers whose non-farming income surpassed KSh. 500,000 comprised 30.66% of the respondents. This follows that there were fewer borrowers who had reasonable income from off-farm sources (Table 6).

Results on repayment performance indicate that there was more default at the rate of 34.43% compared to compliance rate of 9.62% for clients who had no off-farm opportunities. Compliant borrowers who did not have off-farm income had grown their agribusiness to diversified value chains. As such, they would still service their loans well even without non-farm income. Nil off-farm income was observed among low income and inexperienced farmers, most of whom were defaulters. Borrowers with up to KSh. 200,000 had a default rate of 22.95%; those with non-farm income above KSh. 200,000 up to KSh. 500,000 registered a default of 39.34% which was the highest default rate to be recorded. Cumulatively, borrowers with nil to KSh. 500,000 non-farm income defaulted at the rate of 96.72% compared to borrowers with non-farm income beyond KSh. 500,000 whose default rate was a paltry 3.28%. This means that increase in off-farm income decreases default rate because non-agricultural income forms additional sources of income which improves debt servicing capacity (Table 6).

This study found that off-farm income enabled farmers to alleviate on-farm liquidity constraints, thus managing to repay farm loans. Proceeds from farm only provided immediate solution to servicing of basic and domestic expenditure during economic downturns. These findings agree with those of Ntunzwenimana [45] that non-agricultural income increases confidence of households by being a source of finance that raises the probability of early servicing of loan. Ayamo [46] also concurred that availability of non-farm revenue provided savings for funding imminent operations. Finally, Erickson [47] concurred that when there was less farm income it was used to services domestic expenditure and as such needed to be supplemented with off-farm revenue due to its insufficiency to repay loans.

3.1.3.2 Loan performance based on sum of off-farm income

Results showed that the total maximum non-farm income was KSh. 6,000,000 which was also the maximum for compliant borrowers. The maximum for defaulters was KSh. 2,700,000. The minimum in all the cases was nil because borrowers who did not have off-farm income were distributed among the defaulters and non-defaulters. The mean non-agricultural income for defaulters was KSh. 230,459 while that of non-defaulters was KSh. 485,391.2. The average non-farm income for all the respondents was KSh. 433,555. This is amount of annual non-farm income that would enable farmers not to default in repayment despite the economic circumstances (Table 7).

This study found that off-farm income as very important for contingency planning. The agribusiness project is guaranteed of continuity; thus, low probabilities of loan default. The probable reason is that non-farm income cushions farmers against unforeseen contingencies which are likely to occur as farmers engage in agrarian activities, thus causing production fiasco. Non-farm income was

Table 5. Credit repayment status based on sum of borrowing experience

Borrowing experience	Observations	Mean	Std. Dev.	Min	Max
Compliance	239	14.075	8.157	3	40
Default	61	7.942	4.144	2.5	20
Total	300	12.828	7.907	2.5	40

Table 6. Loan servicing status based on off-farm income level

Amount of off-farm income	Percentage performance		
	Compliance	Default	Total
No off-farm income	9.62	34.43	14.67
Up to KSh. 200,000	5.44	22.95	9.00
More than KSh. 200,00 to ksh.500,000	47.28	39.34	45.67
More than KSh. 500,00 to ksh.800,000	27.20	1.64	22.00
More than KSh. 800,00 to ksh.1,000,000	7.95	0.00	6.33
Above KSh. 1,000,000	2.51	1.64	2.33
Totals	100	100	100

Pearson chi2(5) = 57.0474 Pr = 0.000

Table 7. Repayment status of credit based on sum of off-farm income

Off-farm income	Observations	Mean	Std. Dev.	Min	Max
Compliance	239	485,391.2	442,108.5	0	6,000,000
Default	61	230,459	361,231	0	2,700,000
Total	300	433,555	438,555.9	0	6,000,000

also found to be sacrosanct in alleviating off-season liquidity constraints by providing to the fund for consumption smoothing. These findings are in line with those of Ayamo [46] that non-farm income provided a backup reserve which enabled borrowers to still repay loans even when financial hardships occurred. Muruku [44] agreed that off-farm income helped in consumption smoothing and provided capital injection to boost farmer's contribution to the project. Mitei [48] also concurred that access to non-agricultural income enables farmers to procure sophisticated and effective technology which can shorten the rate of return for funded project.

3.1.4 Multiple borrowing

3.1.4.1 Loan Repayment Status Based on Multiple Borrowing

The performance of loan repayment based on multiple borrowing indicates that 10.67% of the respondents had no additional loan on top of AFC loan. Most of these borrowers were successful and seasoned farmers whose projects were well paying, thus able to generate sufficient cashflows for consumption, investment and loan repayment. By this fact, they did not require to borrow additional loans. Borrowers constituting 15.67% of the total respondents had one loan on top of AFC loan; those with two loans comprise 44.33% which is the highest percentage. Overall, borrowers with nil to two loans in addition to AFC comprised 70.67%. This means that more borrowers have fewer additional loans thus depicting little appetite for borrowing. Borrowers with three loan and above were considered to be highly geared. According to the findings, 16.67% had three loans, 11.33% had four loans and 1.33% had more than four loans. Summed up, these borrowers constituted 29.33% (Table 8).

On repayment performance, the analysis showed that borrowers who had no additional credit facilities defaulted by a measly 1.64%. Borrowers with one loan in addition to AFC loan did not default at all. A default of 18.03% was recorded for borrowers with two loans. The cumulative default rate for borrowers with nil to two additional loans was 19.67%. Borrowers with three loans reported a default rate of 27.87%; those with four loans defaulted by 45.90% (the highest default rate). Those with above four loans on top of AFC loan defaulted by 6.56%. The cumulative default for borrowers with three loans and above was 80.33%. This implies that default rate increased with increased appetite for uptake of more loans in addition to AFC loan.

This study established that multiple borrowing indeed hampers loan repayment due to financial burdens which conflicts with loan repayment. Multiple borrowing increased borrower's indebtedness which in turn mad it difficult for them to meet all loan repayment obligations These findings conform with those of Green [49] who established that over-indebtedness further increases with the occurrence of multiple borrowing which hampers compliance in loan repayment. Nwachukwu [23] agreed that borrowers with multiple loans were likely to default on loan repayment. Multiple loan taking largely affects the loan performance since it

affects the borrower's ability due to the level of indebtedness [50].

3.1.4.2 Loan repayment status based on sum of multiple loans

Based on sum of multiple loans, the maximums for loans taken in addition to AFC loan was six both for total and for compliant borrowers. The maximum loan taken by a defaulting borrower was four loans. The minimums in total, compliance and default were nil (0) since there were a number of borrowers in both categories (compliance and default) who had no additional loan on top of AFC agribusiness facility. The average number of loans for compliant respondents was 1.732 loans while defaulters had a mean of 3.410 loans. This means that default increases with the appetite for absorbing more loans. The average loans for all the respondents stood at 2.073 meaning that most of the borrowers in the region had an average of two loans on top of AFC loan. This implies the maximum level of gearing at which loans can be serviced without defaulting. Uptake of loans beyond this limit undermines the debt serving capacity of the borrowers, thus making them unable to meet their loan servicing obligations on a timely fashion (Table 9).

This study found that multiple borrowing served as a red flag to AFC management triggering further screening of prospects and repeat clients before approval and disbursement of loans. Competition for a share of available clients by the growing informal, semi-formal and formal lenders signalled multiplicity of loans. Accumulated debts entered the borrowers into a debt trap, whose solution was either loan recovery or further indebtedness through debt consolidation. In addition, this resulted to subjugation of the AFC borrowers whose projects halted as they turned into perpetual debt payers. These findings concurred with those of Nzomo [51] who agreed that overlapping of loans embodies a borrower's cycle of debt and higher risk of loan default. Kamalrulzaman [52] agreed that multi-borrowed debtors struggle to meet loan obligations at the expense of personal development and investment projects. Also in agreement was Kapapi [50] who reported that multiple borrowing had a direct impact on loan repayment performance due to effect of over-indebtedness. Shapiro [53] concurred that multiple loans caused divided and competing interest in loan servicing.

3.1.5 Borrower – lender distance

3.1.5.1 Loan repayment status based on borrower – lender distance

Results showed that most of the borrowers were domiciled at distance tier above 5 km to 10 km, constituting 29.33% of the borrowers. Borrowers whose distance to the nearest AFC was below 5 km constituted 18.67%. The cumulative percentage of borrowers who lived and operated their projects at a distance not greater than 10 km from their nearest AFC offices comprised of 48%. Borrowers domiciled more than 10 to 15 km composed 26.33%, those within the distance range above 15 to 20 km were 11.67% and those who were above 20 km from their nearest AFC offices comprised of 14%. In all, borrowers constituting 52% of the total respondents resided farther than 10 km from their nearest AFC offices. This implies that more clients were located in a distance considered to be far from AFC offices (Table 10).

Table 8. Repayment performance of loan based on multiple borrowing

Multiple loans	Percentage performance		
	Compliance	Default	Total
No additional loan	12.97	1.64	10.67
One loan	19.67	0.00	15.67
Two loans	51.05	18.03	44.33
Three loans	13.81	27.87	16.67
Four loans	2.51	45.90	11.33
Above four loans	0.00	6.56	1.33
Totals	100	100	100

Pearson chi 2(5) = 131.9628 Pr = 0.000

Table 9. Status of loan repayment based on sum of multiple loans

Multiple loans	Observations	Mean	Std. Dev.	Min	Max
Compliance	239	1.732	0.941	0	6
Default	61	3.410	1.039	0	4
Total	300	2.073	1.174	0	6

The default for borrowers living up to 5 km from nearest AFC was 6.56% (which was the lowest default rate), that of those above 5 to 10 km was 11.48%, which was also the default rate for those in the distance range exceeding 10 km up to 15 km. The cumulative default for AFC borrowers who lived up to 10 km was 18.04%. Analysis of default for customers operating from the distance exceeding 10 km show that 11.48% default rate was recorded for borrowers living more than 10 to 15 km. The default rate of clients living more than 15 to 20 km was 26.23%, while the default rate for customers domiciled above 20 km from their nearest AFC offices was 44.26% (the highest default rate).

The cumulative default rate for borrowers domiciled more than 10 km from AFC was 81.96%. This proves that borrowers who lived farther from their nearest AFC offices defaulted more than their counterparts living close. A comparison of the highest default rate (44.26) with the lowest default rate (6.56%) shows that distance contributes significantly to default. Under default performance, the relationship between borrower-lender distance and default is linear and positive since there is successive increase in default with increase in distance, implying that the lowest distance under analysis recorded the lowest default rate (6.56%) while the highest distance registered the highest default rate (44.26%) [Table 10].

This study found that distance decay correlates positively with loan repayment lag. This is possibly due to friction of distance and its attendant inconveniences. This is because long distance is a great hindrance to supervised lending since it wastes time and increases cost thus inconveniencing the lender. It also causes strategic default emanating from moral hazard since borrowers take advantage of distance aware that it would be difficult for the lender to follow up the loans. Besides, the borrower incurs more costs to travel to AFC offices located far from their residence and also has limited access to agricultural services. These findings agree with those of Yin [54] who found long distance made households to incur high transaction costs. Consequently, there is lower farm profits which leads to default in loan repayment [55]. Also, Negussie [56] agreed that geographic distance increases the costs of information collection and monitoring. Algeri [57] found that distance affected relationship between the borrower and the lender.

3.1.5.2 Loan repayment status based on sum of borrower-lender distance

Results showed that the minimum distance for total and the compliant borrowers was 0.5 km while the maximum is 92 km for both total and defaulting borrowers. The minimum distance for defaulters is 2.5 km and the maximum distance for compliant borrowers is 29 km. The mean distance for all respondents is 12.881 km. This implies that the commune farm should be domiciled at most 12.88 km away from the lending AFC office for a borrower to comply in loan repayment. The mean distance for non-defaulters is 10.54 km while that of defaulters is 22.041 km. This means that default increases with corresponding increase in distance (Table 11).

Table 10. Repayment status based on borrower – lender distance

Borrower – lender distance	Percentage performance		
	Compliance	Default	Total
Below 5 kilometres	21.76	6.56	18.67
More than 5 to 10 kilometres	33.89	11.48	29.33
More than 10 to 15 kilometres	30.13	11.48	26.33
More than 15 to 20 kilometres	7.95	26.23	11.67
More than 20 kilometres	6.28	44.26	14
Totals	100	100	100

Pearson chi2(4) = 84.7643 Pr = 0.000

This study has established that those borrowers near the office readily enjoy lender appointments for purposes like training, farm demonstration and advisory services. The study also observed that distant borrowers repaid their loans with hefty penalties in event of default due to recovery costs. Detachment between loan parties occasioned by distance decay possibly resulted to relationship clash hence triggering borrower exit. Distance was found to substantially hamper the dynamic incentives of the borrower. These findings of this study agree with Granja [58] that distance decay correlated positively with default. Yin [54] agreed that information on the effect of distance helped farmers in making sound borrowing and investment decisions. Mukwami [59] attributed most of the farm loan penalties to recovery charges caused by friction of distance. Herpfer [60] agreed about the possibility of hampered relationship between the borrower and lender which spoils the opportunity for loan graduation. Xia [61] agreed that borrowers who were domiciled in close proximity to the lender enjoyed good network and relationship with the borrower thus, positive externalities from lender's partners who visited the branches.

This study also found that the nearby borrowers became a soft target for all beneficial programmes such as trainings, advisory, field demonstration and market opportunities. However, closeness was disadvantageous to borrowers since they were visited extemporaneously by unexpected guests accompanied by AFC officials. Respondents reported that it was hard to decline such visits even when they were busy thus disrupting their plans and also tampering with their privacy. These findings were concurred by Algeri [57] who agreed that close proximity in lending enhanced supervised lending and heightened the prospects for training and advice. Carbo-Valverde [62] agreed that closer geographical proximity is associated with decreased ex ante vetting and bank's marginal screening cost.

3.2 Description of the Econometric Models on the Effect of Borrower Socio-economic Profile on AFC Loan Default Rate

This subsection discusses the results of logit regression analysis for the effects of borrower's social economic profile on AFC loan default rate. This objective covers five indicators of the independent variable which includes farming experience, borrowing experience, off-farm income, multiple borrowing and borrower-lender distance. The dependent variable is AFC loan default rate with values of 1 for default and 0 for compliance. The econometric model used to demonstrate the relationship between the borrower socio-economic profile and the AFC loan default rate is logit (Table 12).

The model was tested at 5% level of significance and a number of goodness-of-fit measures were done and reported. The first one is the pseudo-R squared and the second, the Likelihood ratio Chi-square which is an estimation of how well the model classified respondents correctly based on estimated probabilities. The likelihood ratio Chi-square of 173.17 with a p-value of 0.00<0.05 shows that the model was statistically significant. The pseudo-R squared was 0.5715 implying that the indicators of the borrower socio-economic profile (independent variable) explained 57.15% of the dependent variable which is AFC loan default rate (Table 12).

The model findings revealed that years of farming experience and borrowing experience had no statistical significance with AFC loan default rate since their p-values were 0.853 and 0.623 respectively greater than the 0.05. The model established that off-farm income, multiple borrowing and borrower-lender distance had a statistically significant effect on AFC loan default rate since their p-values was 0.000 <0.05. To determine the direction of change of the indicators in the model, the coefficients are used. The coefficient of off-farm income is negative implying that it negatively affected AFC loan default rate (Table 12).

The findings show that rise in off-farm income led to surge in AFC loan compliance. However, the positive coefficient of multiple borrowing and borrower-lender distance had a positive effect on the AFC loan default rate. As multiple borrowing and borrower-lender distance increased there was also increase in AFC loan default rate. In determining the extent of change brought by the socio-economic indicators to the AFC loan default rate, marginal change was found to be better other than interpreting the coefficients which would be misleading. The estimated marginal effects of the borrower socio-economic profile indicators on the AFC loan default rate (Table 13).

Table 11. Repayment status of loan based on sum of farm-lender distance

Borrower – lender distance	Observations	Mean	Std. Dev.	Min	Max
Compliance	239	10.54	5.574	0.5	29
Default	61	22.041	13.74	2.5	92
Total	300	12.881	9.172	0.5	92

Table 12. Logit estimates for borrower socio-economic profile

Indicator	Coefficient	Standard errors	Z	P>(z)
Farming experience	-0.018	0.099	-0.19	0.853
Borrowing experience	-0.054	0.110	-0.49	0.623
Off-farm income	-1.356	0.273	-4.97	0.000
Multiple borrowing	1.346	0.270	5.00	0.000
Borrower-lender distance	0.096	0.023	4.22	0.000
Constant	-3.036	0.958	-3.17	0.002
Number of observations	300			
Pseudo R Squared	0.5715			
LR Chi squared	173.17			

Table 13. Estimated marginal effects of the Socio-economic indicators

Indicator	Dy/dx	Standard error	Z	P>(z)
Farming experience	-0.001	0.006	-0.18	0.853
Borrowing experience	-0.003	0.006	-0.50	0.617
Off-farm income	-0.079	0.022	-3.52	0.000
Multiple borrowing	0.078	0.023	3.37	0.001
Borrower-lender distance	0.006	0.002	3.15	0.002

The marginal derivatives revealed that improvement in off-farm income by a unit led to a 0.079 reduction in the rate of loan default. This may imply that as off-farm income reduced chances of defaulting. Farmers were able to get other incomes from other enterprises apart from the AFC loan project to service the borrowed funds. The negative coefficient of default meant that higher possibility of default on loan repayment reduced the chances of qualification to obtain credit from formal sources. Aswathy [63] used logit analysis to report that off-farm income provided farmers with some capital for purchasing productivity enhancing inputs such as improved seed and fertilizers which boosted production and income levels that facilitated loan repayment.

The model findings in this study also showed that AFC borrowers who had multiple loans from different sources were at a very high chance of defaulting the AFC loan. Multiple borrowing was associated by a marginal increase in default rate of 0.078. As the borrower increased loans from other sources the more the rate of defaulting the AFC loan. This finding conformed to observation by Oluwasanya [64] who reported logit results that showed that multiple borrowing, was statistically significant and had a marginal of 0.1092 meaning that with increase in the number of loan borrowings, default rate also increased.

This study found that increase distance from home farm to the AFC office by one kilometre is associated by a 0.006 increase in default rate implying borrowers who are residing far from the AFC had more chances of defaulting. The findings may imply that borrowers far away from the AFC could not easily get in touch with the AFC officers to enjoy advisory and training opportunities which led to most of them defaulting. This finding was congruent to the observation by Chong [65] who established that distance decay connected directly with loan default.

4. CONCLUSION

The study concluded that disbursing AFC loans to borrowers with diverse opportunities for off-farm income was a good strategy since they are guaranteed of income sources during economic downturns. Borrowers who had appetite for double dipping and those residing far away from AFC were risky and had a proclivity of escalating the probability of default. Multiple borrowers

should have their applications deferred until they clear a reasonable amount which reduces their debt servicing ratio. AFC officials can embrace farmer experiences so as to select professional farmers who are conversant with operational details of their agribusiness including embedment of credit input. The study recommends borrowers to take insurance schemes which can be supported by the lender and the government; besides, farming communities are encouraged to team up and form common interest groups to source for affordable inputs, market their produce, take joint insurance schemes, negotiate for improved conditions and lobby to be supported when need arises.

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COMPETING INTERESTS

Authors Have Declared That No Competing Interests Exist

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